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AUTHOR Donovan, Edward P.; Korman, Barbara
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ABSTRACT

A course in environmental science was developed to increase course options for students of all abilities and interest levels. Major topic areas of the course include: introduction to ecological principles and ecosystems; extinction of species; human population dynamics; agricultural systems and pest control; air quality; water quality; solid waste; energy and the environment; and noise pollution. This document provides (1) the philosophy of the course; (2) the course description; (3) the course outline; (4) a list of subject proficiency requirements arranged by major topic areas; (5) a table correlating these proficiences with course scope and sequence, instructional activities, and evaluation methods; (6) a list of procedures for course evaluation and review; (8) a course evaluation form; and (9) lists of instructional materials and equipment. Also included are a list of the educational goals of the Moorestown Public School District and a statement of the philosophy of this district's high school science department. (JN)

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COURSE GUIDE

MOORESTOWN TOWNSHIP PUBLIC SCHOOLS

MOORESTOWN, NEW JERSEY 08057

COURSE TITLE: ENVIRONMENTAL SCIENCE

SCHOOL: HIGH SCHOOL

PROGRAM: SCIENCE

DATE: JULY 25, 1983

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
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COMMITTEE MEMBERS:

Dr. Edward P. Donovan

Mrs. Barbara Korman

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Summer Curriculum Work for New Course Offering: ENVIRONMENTAL SCIENCE

I. Criteria for development of course

The Curriculum Guide which will be developed for this course will adhere to the Course Guide Outline. The specific areas that will be addressed are:

1. Course description (already completed)
2. List of specific proficiencies for the course.
3. Content outline
4. Suggested teaching strategies, including laboratory activities
5. Instructional supplies and equipment

If time is remaining after the above areas are completed, the members of the curriculum committee will spend time working on the following areas:

1. Inventory all supplies and equipment related to the course
2. Evaluate and select AV software
3. Evaluate and select microcomputer software
4. Develop evaluative instruments
5. Make the initial arrangements for acquiring guest speakers for the career education part of the course

A general description of the course content is included in the course description.

The general purpose of this of this course is to increase the the course options for students of all ability and interest levels.

The course will be designed for students who have successfully completed one year of high school science.

II. Work Plan:

Who: Dr. Edward P. Donovan
Barb Korman

When: 30 hours (15 hours each) - Summer

Dates: July 18 - July 22 1:00-4:00 pm

Place: High School, Room C-16

GOALS

The district goals met by this course are I-IV, VI-X, XII-XIV, and XVIII-XX. These specific goals are underlined on the following attached list of "Educational Goals of the Moorestown Public School District" that was developed during 1977-1980.

EDUCATIONAL GOALS OF THE MOORESTOWN PUBLIC SCHOOL DISTRICT

I. To acquire basic skills in mathematics, language arts, obtaining information, problem solving, critical thinking, and be able to communicate information effectively.

II. To learn to enjoy the process of learning and to acquire the skills necessary for a lifetime of continuous learning and adaptation to change through creative use of various instructional methods, materials, and equipment.

III. To provide a broad educational program which creates a learning environment that fosters positive feelings toward self and others and healthy competition in order that each student may develop individual talents, interests, and skills.

IV. To acquire a stock of basic information, including knowledge about our own and other societies, an understanding of the physical and biological worlds, and familiarity with the methods of discovering new knowledge.

V. To make certain that the instructional, administrative, and support staff is of a high quality in every respect.

VI. To understand and accept himself/herself: own worth, potentialities and limitations.

VII. To insure that specialized and individualized kinds of educational experiences are available for meeting the particular needs of every student through the utilization of educational tests, individual and small group instruction, and the opportunity for students who are interested in exploring the same problem have some choice in selection of materials and opportunity to collaborate.

VIII. To acquire an understanding of ethical principles and values and the ability to apply them to his/her own life.

IX. To insure that all instruction bears a meaningful relationship to the present future needs and/or interests of students and that verbal interaction and questioning between teacher/student, student/student, be encouraged.

X. To acquire a capacity for forming satisfying relationships with a wide range of people, including those with social and cultural backgrounds different from his/her own.

XI. To acquire the ability and desire to express one's self creatively in one or more of the arts, and to appreciate the aesthetic expressions of other people.

XII. To acquire the knowledge, habits, and attitudes that promote personal and public health, both physical and mental.

XIII. To become an effective and responsible contributor to the decision-making process of the political and other institutions of the community, state, country and world through opportunities to participate in attempts to solve individual, school, and community problems.

XIV. To provide quality services for all students in the areas of academic and career planning, guidance and counseling.

XV. To insure that resources for education are used with maximum efficiency.

XVI. To insure that teachers and students have significant representation and opportunity for participation in decision-making councils that affect the operation of the school they work in.

XVII. To insure that educational experiences be determined by the utilization of the student's age, educational test results, and observations of the student functioning in the learning process.

XVIII. To acquire the knowledge, skills, and understanding that permit him/her to play a satisfying and responsible role as both producer and consumer.

XIX. To be aware of family responsibilities and to develop an understanding and appreciation of the principles of living in the family group.

XX. To develop and utilize diverse forms of constructive cooperation with parents and community groups.

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PHILOSOPHY OF THE COURSE

1. One of the major purposes of this course is to offer science courses that are consistent with the High School Science Department's newly adopted " Philosophy of Science Education" (see the attached philosophy). This course represents a trend toward offering more science courses that are useful in everyday life, that are activity-oriented, and practically-based. This course is also based on the idea that all students need to become scientifically and technologically literate.

2. Another purpose of this course is to offer more courses that are better designed to meet the science needs and interests of those students that are not as academically inclined. Because this course is open to all students, it is hoped that students of various ability and interest levels that have not been in class together will be able to successfully work together in new situations.

3. A third major purpose of this course relates to the fact that the amount of scientific knowledge is greatly increasing each day. Because of this, the biology courses do not have sufficient time to cover this important area. Therfore, there was a need for an interdisciplinary science course that covers those areas the other courses are unable to cover sufficiently.

4. This course is intended to enable students to gain a greater appreciation of nature, and a better understanding of their influence on the balance of nature.

5. Finally, it is the intention of this course to enable students to have a greater understanding of the various occupations that are related to environmental science. As it is developed, this course will incorporate the outside community into its instructional activities. During the school year, the instructor will invite various representatives of community employed in environmentally related occupations to speak to the students.

Statement of Philosophy of the Science Department

The members of the science department at Moorestown High feel that science is an essential component in the total education process. Science education is the link between science, technology and society. The ultimate goal of the science program at Moorestown High School is to develop scientifically and technologically literate citizens, as well as to prepare students for scientific and/or technological careers.

The science department defines a scientifically and technologically literate citizen as being able to:

1. use scientific concepts, process skills, and values in making responsible everyday decisions.
2. understand how society influences science and technology as well as how science and technology influence society.
3. recognize the limitiations as well as the usefulness of science and technology in advancing human welfare.
4. explain the major concepts, hypotheses, and theories of science and is able to use them.
5. understand that the generation of scientific knowledge depends upon the inquiry process and upon conceptual theories.
6. distinguish between scientific evidence and personal opinion.
7. recognize the origin of science and understand that scientific knowledge is tentative and subject to change as evidence accumulates.
8. understand the application of technology and the decisions entailed in the use of technology.
9. find reliable sources of scientific and technological information and use these sources in the process of decision-making.
10. appreciate the worthiness of research and technological development by having sufficient knowledge and experience in the sciences.
11. appreciate science and technology for the intellectual stimulus they provide.
12. understand that society controls science and technology through the allocation of resources.
13. have a richer and more exciting view of the world as a result of science education.

In order to enable each student in our high school to become scientifically and technologically literate, while at the same time prepare interested students for careers in science and technology, the science teachers of Moorestown High School use the following methods, principles and ideas to guide our science teaching:

1. offer courses in the fundamental earth, physical and biological sciences with emphasis on basic concepts.
2. teach the scientific process and practice it in the laboratory through experimentation and manipulation of materials.
3. have all science courses be laboratory oriented so that students will develop skills in critical observation, problem solving, and decision-making.

4. emphasize performance and responsibility on the part of the student.
5. provide instruction in a wide range of science activities, skills and concepts to meet the needs of all students.
6. offer a variety of courses to educate students of differing abilities in the major scientific concepts.
7. enable students to go beyond the science learning that occurs in the classroom through directed and independent study, and science clubs.
8. encourage students to take courses in the sciences beyond the state and school minimum requirements.
9. provide information and guidance as to the vocational application and opportunities in science and technology.

COURSE DESCRIPTION

ENVIRONMENTAL SCIENCE
(3 credits - 3 double periods per week, one semester)

This is a general introductory course in applied science intended for students of various interests and academic abilities. This course will provide students with a basic understanding of the living and non-living factors that influence their environment. The human environment will be studied in both its unspoiled and spoiled condition.

Depending upon the interests and academic abilities of the students, they will study a wide variety of topics, such as: ecology; extinction; populations; energy; agriculture; air, water and noise pollution; conservation; pest control; solid waste & recycling, and environmental law. The course will involve an equal emphasis on laboratory activities and lecture/discussion. Various indoor and outdoor hands-on activities will be used. The students will measure various air and water pollutants, perform soil analyses, perform material recycling activities, estimate plant and animal populations and a wide variety of other activities. When available, guest speakers representing various occupations that directly affect the human environment will be incorporated into the course.

With the approval of the instructor, each student will investigate a particular area of interest to them that relates to environmental science, and complete an in-depth course project. This course is not to be taken in lieu of biology, chemistry, or physics by a student who will attend college. It can, however, be used as a laboratory science course for college admission. Prerequisites: one physical science and one biological science course.

ENVIRONMENTAL SCIENCE: Subject Matter Outline

I. Introduction to Ecological Principles & Ecosystems

- A. Basic definitions
- B. Energy relationships
- C. Nutrient cycles
- D. Introduction to the earth's biomes
- E. Ecosystem homeostasis
- F. Natural succession
- G. Population growth and carrying capacity
- H. Environmental influences on ecosystems
- I. Ecosystems and global balance
- J. Economic, social and legal implications of pollution

II. Extinction of Species

- A. Species concept
- B. Causes of extinction
- C. Mechanisms of extinction
- D. Legal aspects
- E. Economic, asthetic, social & ecological implications
- F. Case studies of extinct species
- G. Endangered species

III. Human Population Dynamics

- A. Demography
- B. Factors influencing population growth
- C. Laws and social attitudes
- D. Land use and human populations
- E. Sociological effects of changing population density
- F. Health effects of changing population density
- G. World wide population trends

IV. Agricultural Systems and Pest Control

A. Basic definitions
B. Role of soil
C. Agricultural practices
D. Environmental effects of agricultural practices
E. Famine and food production
F. Chemical food additives
G. The great insecticide debate
H. Overview of major pesticides
I. Effects of pesticides on environmental systems
J. Effects of pesticides on human health
K. Alternative methods of pest control
L. Politics and economics of pesticides

V. Air Quality

A. The nature of the atmosphere
B. Sources of air pollution
C. Air pollutants
D. Climatological and meteorological influences on air quality
E. Detection and measurement of air pollutants
F. Air pollution control devices
G. Effects of air pollution on ecosystems
H. Effects of air pollution on human health
I. Global effects of air pollution
J. Air pollution and the law

VI. Water Quality

A. Natural water cycle
B. Ecology of freshwater systems
C. Sources of water pollution
D. Fresh and salt water pollutants
E. Abiotic and biotic indicators of pollution
F. Measurement of water quality
G. Water and wastewater treatment and control
H. Effects of water pollution on ecosystems
I. Effects of water pollution on human health
J. Economic, social and pollitical considerations of water quality

VII. Solid Waste

A. Composition of municipal and industrial solid waste
B. Disposal methods
C. Recycling methods
D. Why worry about solid waste?
E. Solid waste- an individual problem

VIII. Energy and the Environment

A. Basic principles of energy
B. Fossil fuels and their environmenatl effects
C. Hydroelectric energy and environmental effects
D. Nuclear fuels and their environmental impact
E. Renewable energy resources
F. Thermal power
G. Solar energy
H. Energy consumption
I. Economics of energy consumption
J. Energy conservation

IX. Noise Pollution (Optional)

A. Principles of sound
B. Measurement of sound
C. Sources of noise pollution
D. Effects of noise pollution
E. Noise pollution control
F. Legislation and public concerns

SCIENCE DEPARTMENT

Moorestown High School
Subject Proficiency Requirements

SUBJECT: Environmental Science

CREDITS: 3
DATE: 7/83

Every student must complete the following proficiency to receive credit for this course:

M- The student must complete a major course project involving some aspect of environmental science.

In addition to the above proficiency, the student must demonstrate mastery of 60% of the following proficiencies to receive credit for the course. Each proficiency should be read as "The student should be able to . . . "

I. Introduction to Ecological Principles and Ecosystems

1-1 distinguish between niche, ecosystem and biome.
1-2 list and describe major biomes
1-3 construct a food web, food chain and food pyrimid
1-4 explain major nutrient cycles
1-5 describe the natural succession in a deciduous forest.
1-6 give examples of the economic, social and legal impact of pollution.
1-7 list and describe major ecosystems
1-8 describe the relationship of global ecosystems to the environmental balance of the environment.
1-9 explain the concept of carrying capacity.
1-10 analyse data on representative natural populations
1-11 relate roles and niches of organisms in natural and laboratory ecosystems
1-12 measure various abiotic factors in the environment
1-13 identify representative organisms in given ecosystems

II. Extinction of Species

2-1 Explain the definition of species and its limitations
2-2 list the major causes of extinction
2-3 explain, by using specific examples, how a species becomes extinct
2-4 discuss the ecological, social, economic and asthetic impact of extinction
2-5 list major extinct species
2-6 list major endangered species and why they are endangered
2-7 write or present a report on an assigned endangered or extinct species
2-8 summarize the research procedure followed in the Case of the Bighorn Sheep.

III. Human Population Dynamics

3-1 find density of an area given necessary data
3-2 describe factors which change populations in an area
3-3 recognize representative population pyrimids
3-4 relate population growth to land use problems
3-5 list major social attitudes concerning population control
3-6 list major legal precedents effecting population control in the United States and other countries
3-7 compare the population of progressive and third world countries
3-8 project the human conditions in countries or areas given the average population growth rate and the per capita income
3-9 analyze data for natural populations and project future of population
3-10 estimate the size of populations in artificial and/or natural areas
3-11 differentiate between open and closed populations
3-12 read and interpret population data on graphs and tables

IV. Agricultural Systems & Pest Control

4-1 analyze soil samples for abiotic factors
4-2 analyze soil samples for biotic factors
4-3 list common agricultural practices and discuss their environmental impact
4-4 use millipore filter apparatus in soil analysis
4-5 use a Berlese apparatus
4-6 list major food additives and their effects on human health
4-7 discuss the world-wide food production problems
4-8 identify major soil organisms
4-9 list major pesticides and discuss their positive and negative aspects, focusing on DDT
4-10 describe alternative methods of pest control
4-11 discuss the composition of soil
4-12 discuss pollitical and economic impact of pesticides

V. Air Quality

5-1 collect and measure various major air pollutants
5-2 describe the nature of the atmosphere
5-3 list the major sources of air pollution
5-4 list and describe major air pollutants
5-5 describe those events that lead to a temperature inversion
5-6 simulate a temperature inversion in the lab
5-7 describe air pollution control devices commonly in use
5-8 describe the effects of air pollution on certain organisms including humans
5-9 demonstrate a knowledge of air pollution control laws
5-10 describe & simulate the effects of acid rain on organisms
5-11 use lab procedures & techniques to test for effects of air pollution
5-12 predict effects of air pollution on representative organisms and varify in the laboratory
5-13 list and discuss the global effects of air pollution

VI. Water Quality

6-1 draw a diagram of the natural water cycle
6-2 list sources of water pollution
6-3 describe abiotic and biotic factors in freshwater systems
6-4 define eutrophication
6-5 discuss natural and artificial causes of eutrophication
6-6 discuss controls of eutrophication
6-7 list fresh water pollutants
6-8 list salt water pollutants
6-9 list indicator organisms for fresh and salt water systems and describe the habitat in which they are found
6-10 sample, measure and analyse water for its physical & chemical factors
6-11 describe primary, secondary and tertiary treatment in a sewage disposal plant
6-12 discuss the treatment of drinking water
6-13 list and discuss the effects of water pollution on economics and human health
6-14 demonstrate an awareness of the legal, economic, social and pollitical implications of water pollution
6-15 analyse data of case studies involving water pollution

VII. Solid Waste

7-1 list and describe the composition of solid waste
7-2 list and discuss common disposal methods
7-3 describe a recycling plant
7-4 describe local recycling efforts
7-5 tell where Moorestown's solid waste is processed.
7-6 simulate various recycling methods in lab experiments
7-7 list activities the individual can do to aid the solid waste problems in Moorestown

VIII. Energy and the Environment

8-1 define energy
8-2 describe major types and forms of energy
8-3 describe the law of conservation of energy
8-4 list major sources of energy
8-5 describe how fossil fuels are acquired and used in energy production
8-6 describe the future of energy sources for the United States and other major countries
8-7 describe the environmental effects of fossil fuels
8-8 describe the production of energy using water and the resulting environmental effects
8-9 describe the basic operations of a nucleur reactor
8-10 discuss the advantages and disadvantages of nucleur power and its potential environmental impact
8-11 list renewable sources of energy and describe their value to the environment and the current energy situation

8-12 discuss the use of thermal power
8-13 discuss how a solar cell operates
8-14 discuss the average energy consumption of U.S. residents, contrasting it with that of other countries
8-15 discuss legal, economic and pollitical implications of energy conservation
8-16 describe methods that can be used by individuals in the country to conserve energy

IX. Noise Pollution(optional)

9-1 describe the characteristics of sound
9-2 describe the measurement of sound
9-3 list major sources of noise pollution and their effects
9-4 describe methods used in controling noise pollution
9-5 discuss legislation and public concern regarding noise pollution
9-6 list what you can do as an individual to control noise pollution

General Laboratory Related Proficiencies

G-1 draw a graph given specific data
G-2 interpret graphs
G-3 organize and present data in the most appropriate form (ie. tables, graphs, diagrams, charts etc.)
G-4 measure and interpret the pH of soil and water samples
G-5 perform correct measurements using metric instruments
G-6 demonstrate the use and care of the compound microscope
G-7 carry out laboratory activities being able to explain procedure, observations, results and conclusions in oral or written form

UNIT I. Introduction to Ecological Principles & Ecosystems

1-1 Relationships Between a Plant & Animal
1-2 Abiotic Environment: A Comparative Study
1-3 A Laboratory Ecosystem
1-4 Interactions in the Biosphere
1-5 Ecosystems & Energy
1-6 Changing Biotic Communities
1-7 A Yeast Population Study
1-8 Microcommunities
1-9 Air & Soil Temperature Analysis

UNIT II. Extinction of Species

2-1 Paleontologic Comparison
2-2 The Case of the Bighorn Sheep

UNIT III. Human Population Dynamics

3-1 Population Changes: A Model
3-2 Populations
3-3 Population Changes: Field Data
3-4 Population Growth
3-5 Changes in the Survival Rate of U.S. Populations
3-6 Estimating Populations

UNIT IV. Agricultural Systems and Pest Control

4-1 Organisms in Litter & Soil
4-2 A Soil Community
4-3 Soil Chemistry
4-4 The Formation of Rock Fragments
4-5 Soil Analysis
4-6 Soil Ecology: Water Holding Capacity
4-7 Calculating Moisture Content of the Soil
4-8 Soil Organisms
4-9 Kit: Microorganisms in the Soil

UNIT V. Air Quality

5-1 The Infernal Combustion Engine
5-2 Nationwide Emmissions of Air Pollutants
5-3 Acid Rain
5-4 Air Pollution Test Kit Lab
5-5 An Atmosphere in Crisis Module
5-6 Sulfur Dioxide Kit

UNIT VI. Water Quality

6-1 Testing Water Quality
6-2 Sudsing and Hardness
6-3 Effect of a Large Town on a River
6-4 Effect of a Chemical Plant on a River
6-5 Biochemical Oxygen Demand
6-6 Thermal Pollution
6-7 Water Quality Analysis
6-8 Coliform Bacteria
6-9 Thermal and Sewage Pollution (kit)

UNIT VII Solid Waste

7-1 Solid Waste and Recycling

UNIT VIII. Energy and the Environment

8-1 Natural Resources, Energy & Pollution

ENVIRON SCI COURSE GUIDE '83

PROFICIENCY CODE	SCOPE AND SEQUENCE	INSTRUCTIONAL ACTIVITIES	EVAL. OF PROFICIENCIES AND CLASSWORK
1-1 TO 1-13 (G-1 TO G-7)	INTRODUCTION TO ECOLOGICAL PRINCIPLES AND ECOSYSTEMS (TEXT - CHAPTERS 1-3)	READ CHAPTERS 1-3 PROBLEMS AND QUESTIONS CHAPTERS 1-3 LAB EXERCISES 1-1 TO 1-9 TAKE-HOME EXPERIMENTS CHAPTERS 1-3 FILMSTRIP/CASS - "THE DECIDUOUS FOREST", "HOW ENVIRONMENTS CHANGE" REFER TO "TERRESTRIAL ECOLOGY" - CHAPTER 3 & 4 ADDITIONAL LAB ACTIVITIES CHAPTER 5, FIELD STUDIES CHAPTER 7, CASE STUDIES	UNIT TESTS - TEACHER MADE QUIZZES - TEACHER MADE HOMEWORK QUESTIONS AND PROBLEMS LAB REPORTS CLASS REPORTS TAKE-HOME EXPERIMENT REPORTS CASE STUDIES
2-1 TO 2-8 (G-1 TO G-3, G-5, G-7)	EXTINCTION OF SPECIES (TEXT - CHAPTER 4)	READ CHAPTER 4 PROBLEMS AND QUESTIONS CHAPTER 4 TAKE HOME EXPERIMENTS CHAPTER 4 FILMSTRIP/CASS - "CASE OF THE BIG HORN SHEEP" "SEA OTTER AND ITS ENVIRONMENT" "SEA [illegible]ER AND MAN" LAB EXERCISE 2-1	UNIT TESTS - TEACHER MADE QUIZZES - TEACHER MADE HOMEWORK QUESTIONS AND PROBLEMS LAB REPORTS CLASS REPORTS TAKE-HOME EXPERIMENT REPORTS
3-1 TO 3-12 (G-1 TO G-7)	HUMAN POPULATION DYNAMICS (TEXT - CHAPTERS 5 & 6)	READ CHAPTERS 5 & 6 PROBLEMS AND QUESTIONS CHAPTERS 5 & 6 LAB EXERCISES 3-1 TO 3-6 TAKE HOME EXPERIMENTS CHAPTER 6	UNIT TESTS - TEACHER MADE QUIZZES - TEACHER MADE HOMEWORK QUESTIONS AND PROBLEMS LAB REPORTS CLASS REPORTS TAKE-HOME EXPERIMENT REPORTS
4-1 TO 4-12 (G-1 TO G-7)	AGRICULTURAL SYSTEMS AND PEST CONTROL (TEXT - CHAPTERS 10-11)	READ CHAPTERS 10 & 11 PROBLEMS AND QUESTIONS CHAPTERS 10-11 LAB EXERCISES 4-1 TO 4-9 TAKE HOME EXPERIMENTS CHAPTERS 10-11 SUGGESTED LOCAL PROJECT - SPRAYING FOR GYPSY MOTHS IN MOORESTOWN REFER TO "ENVIRONMENTAL POLLUTION" - CASE STUDIES, CHAPTER 8	UNIT TESTS - TEACHER MADE QUIZZES - TEACHER MADE HOMEWORK QUESTIONS AND PROBLEMS LAB REPORTS CLASS REPORTS TAKE-HOME EXPERIMENT REPORTS CASE STUDIES CLASS PROJECT REPORT
5-1 TO 5-13 (G-1 TO G-5, G-7)	AIR QUALITY (TEXT - CHAPTER 12)	READ CHAPTER 12 PROBLEMS AND QUESTIONS CHAPTER 12 TAKE HOME EXPERIMENTS CHAPTER 12 LAB EXERCISES 5-1 TO 5-6 FILMSTRIP/CASS -"AIR POLLUTION" REFER TO "ENVIRONMENTAL POLLUTION" - LABS CHAPTER 7 CASE STUDIES CHAPTER 8 CLASS PROJECT - AUTOMOBILE EXHAUST ANALYSIS	UNIT TESTS - TEACHER MADE QUIZZES - TEACHER MADE HOMEWORK QUESTIONS AND PROBLEMS LAB REPORTS CLASS REPORTS TAKE-HOME EXPERIMENT REPORTS CASE STUDIES CLASS PROJECT REPORT
6-1 TO 6-15 (G-1 TO G-7)	WATER QUALITY (TEXT - CHAPTER 13)	READ CHAPTER 13 PROBLEMS AND QUESTIONS CHAPTER 13 TAKE HOME EXPERIMENTS CHAPTER 13 LAB EXERCISES 6-1 TO 6-9 FILMSTRIP/CASS - "SALT WATER:WATER POLLUTION", "FRESH WATER:WATER POLLUTION FIELD TRIP - MOORESTOWN SEWAGE PLANT WATER ANALYSIS OF STRAWBRIDGE LAKE	UNIT TESTS - TEACHER MADE QUIZZES - TEACHER MADE HOMEWORK QUESTIONS AND PROBLEMS LAB REPORTS CLASS REPORTS TAKE-HOME EXPERIMENT REPORTS CASE STUDIES CLASS PROJECT REPORT

ENVIRON SCI COURSE GUIDE '83

PROFICIENCY CODE	SCOPE AND SEQUENCE	INSTRUCTIONAL ACTIVITIES	EVAL. OF PROFICIENCIES AND CLASSWORK
		REFER TO "ENVIRONMENTAL POLLUTION" - LABS CH 6, CASE STUDIES CH 8 REFER TO "FRESH WATER ECOLOGY" - LABS CH 5, FIELD STUDIES CH 6, CASE STUDIES CH 7	FIELD TRIP REPORT
7-1 TO 7-7 (G-1 TO G-3, G-5, G-7)	SOLID WASTE (TEXT - CHAPTER 14)	READ CHAPTER 14 PROBLEMS AND QUESTIONS CHAPTER 14 TAKE HOME EXPERIMENTS CHAPTER 14 LAB 7-1 FILMSTRIP/CASS - "BEER CAN BY THE HIGHWAY" SUGGESTED PROJECT - "WHERE DOES YOUR TRASH FROM MOORESTOWN END UP?" FIELD TRIP - LAND FILL AND RECYCLING CENTER	UNIT TESTS - TEACHER MADE QUIZZES - TEACHER MADE HOMEWORK QUESTIONS AND PROBLEMS LAB REPORTS CLASS REPORTS TAKE-HOME EXPERIMENT REPORTS CLASS PROJECT FIELD TRIP REPORT
8-1 TO 8-16 (G-1 TO G-3, G-5, G-7)	ENERGY AND THE ENVIRONMENT (TEXT - CHAPTERS 8 & 9)	READ CHAPTERS 8 & 9 PROBLEMS AND QUESTIONS CHAPTERS 8 & 9 TAKE-HOME EXPERIMENTS CHAPTER 9 LAB 8-1 FILMSTRIP/CASS - "NATURAL GAS - SCIENCE BEHIND YOUR BURNER" "MORE TO COME" "AMERICA'S CHANGING ENERGY STORY"	UNIT TESTS - TEACHER MADE QUIZZES - TEACHER MADE HOMEWORK QUESTIONS AND PROBLEMS LAB REPORTS CLASS REPORTS TAKE-HOME EXPERIMENT REPORTS
9-1 TO 9-6 (G-1 TO G-3, G-5, G-7)	NOISE POLLUTION (OPTIONAL) (TEXT - CHAPTER 15)	READ CHAPTER 15 QUESTIONS AND PROBLEMS CHAPTER 15 TAKE-HOME EXPERIMENTS CHAPTER 15	UNIT TESTS - TEACHER MADE QUIZZES - TEACHER MADE HOMEWORK QUESTIONS AND PROBLEMS CLASS REPORTS TAKE-HOME EXPERIMENT REPORTS
M	COURSE PROJECT	COURSE PROJECT - 9TH PERIOD ACTIVITY OR OUTSIDE OF CLASS	COURSE PROJECT REPORT ORAL PRESENTATION
REVIEW 1-1 TO 8-16 (9-1 TO 9-6)		REVIEW	FINAL EXAMINATION

EVALUATION PROCEDURES: Students' grades will be determined by the following:

1. Quizzes
2. Tests
3. Homework (readings & written)
4. Laboratory work
5. Laboratory reports/notebook
6. Written and/or oral reports
7. Classroom participation
8. Notebook
9. Projects
10. Final examination (departmental)

EVALUATION OF CLASSWORK:

A student's classwork is a basic determinant in grades assigned. This includes the quality and quantity of such factors as verbal and physical participation, preparedness, attentiveness, conduct, and attendance, as each contributes to the individual's progress within the classroom. Students are expected to attend ALL classes. Excessive absences of any kind will certainly be reflected in the "class participation" portion of a student's marking period grade. (Refer to "Excessive Absences" in the Student-Parent Handbook).

ACHIEVEMENT RATINGS: Student achievement shall be rated by letters with the following significance:

A - High Achievement
B - Above Average
C - Average
D - Below Average
E - Failure

NC - No Credit
P - Pass
F - Fail
WF - Withdrew Failing
WP - Withdrew Passing

PROCEDURES FOR COURSE EVALUATION AND REVIEW

Evaluation of the success of the course, and the plan for improving the course is discussed in the following statements:

1. Each students' progress in meeting the proficiencies, which is a way of determining success of the course, will be determined by teacher observation and evaluation of the quality of his/her students' laboratory work and reports, projects, discussions, notebook, written homework, written tests and quizzes, class participation, and success on the final examination.
2. Using a course evaluation form developed to survey student observations and opinions about a particular class, each student will have the opportunity to evaluate the course and the instructor at the end of the semester. (See the attached "Course Evaluation Form")
3. Using a less structured form than the one mentioned in #2, the students will have the opportunity to do a self-evaluation of their successes and failures.
4. The instructor will be constantly monitoring course successes and failures so that improvements in the approach, proficiencies, activities and course outline can be made before the course is offered again.
5. If it is necessary, the instructor will apply for curriculum funding for Summer, 1984 in order to make the necessary course improvements.

COURSE EVALUATION FORM

Please make all your comments as honestly as possible and DO NOT sign your name. YOUR COMMENTS MUST REMAIN ANONYMOUS.

Name of the course:

Name of the teacher:

Please answer the following questions by circling the appropriate number.

1. My class standing is: (1) Freshman (9th) (2) Sophomore (10th) (3) Junior (11th) (4) Senior (12th).

2. My present high school average is: (1) A (2) B (3) C (4) D (5) E.

3. The grade that I expect to earn in this course is: (1) A (2) B (3) C (4) D (5) E.

4. This course was required (1) Yes (2) No.

5. The teacher spoke clearly and audibly (1) always (2) most of the time (3) some of the time (4) occasionally (5) rarely.

6. The teacher's class presentations were clear and well organized: (1) always (2) mostly (3) some of the time (4) occasionally (5) rarely.

7. The teacher's manner of presentation made note taking easy. (1) absolutely true (2) mostly true (3) sometimes (4) occasionally true (4) not usually true (5) absolutely untrue.

8. The teacher's ability to give information to the student concerning his/her performance to increase learning was: (1) excellent (2) good (3) average (4) poor (5) very poor.

9. The ability of the teacher to stimulate the interests of the students for the course was: (1) excellent-the teacher stimulated much interest in the students (2) good (3) average (4) poor (5) very poor.

10. The teacher's preparation for the course was: (1) excellent- very prepared (2) good (3) average (4) poor (5) very poor-not prepared at all.

11. The teacher's use of classroom time was (e.g., class began and ended on time): (1) excellent-very efficient (2) good (3) average (4) poor (5) very poor-much time was wasted.

12. The teacher's interest in and availability to the student (especially during ninth period) was: (1) exceptional-high interest, high availability (2) good (3) moderate (4) poor (5) very poor-no interest, impossible to see.

13. The teacher's willingness to respond to questions asked during class was: (1) excellent-always answered student's questions (2) good (4) poor, 5) very poor-avoided student's questions.

14. The teacher's presentation of the course proficiencies, goals, and grading procedures were: (1) very clear (2) clear (3) O.K. (4) unclear.

15. I felt that the classroom activities were generally: (1) way over my head (2) a little complex (3) just at the right level (4) somewhat beneath my level of understanding (5) well beneath my level of understanding.

16. The classroom activities were: (1) well balanced-using a mixture of laboratory activities, discussions, lectures, demonstrations, etc., (2) moderately balanced-using many activities, but some used much more than others (3) not balanced-emphasizing one type of activity much more than the others.

17. The teacher used helpful and practical examples to clarify difficult concepts: (1) most of the time (2) many times (3) occasionally (4) rarely (5) never.

18. The ability of the teacher to establish and maintain a good relationship with the students during class was: (1) excellent-fine working relationship with students (2) good (3) adequate (4) not very good (5) poor.

19. The ability of the teacher to intertwine the various aspects of the course (examples: demonstrations, lab activities, discussions, homework, reading, testing, etc.) was: (1) excellent (2) good (3) average (4) poor (5) very poor.

20. The readability of the textbook was: (1) very good (2) good (3) average (4) on the hard side (5) awful.

21. Did the material covered in the tests and quizzes meet the objectives of the course, that is, were the tests and quizzes fair? (1) yes, absolutely (2) for the most part, yes (3) absolutely not.

22. Compared to other courses, this course: (1) required more time (2) was somewhat more time consuming (3) was about average in time required (4) took less time than most other courses (5) was a breeze.

23. Do you feel that this course added significantly to your knowledge and appreciation of the subject? (1) very much so (2) yes (3) somewhat (4) not especially (5) not at all.

24. Your overall rating of the course is: (1) excellent-a very valuable learning experience (2) good (3) average (4) poor (5) very poor-a waste of time.

25. Would you take another course from this teacher: (1) very much so (2) yes (3) maybe (4) only if I had to (5) absolutely not.

ADDITIONAL COMMENTS:

ENVIRONMENTAL SCIENCE: Instructional Materials and Equipment

Textbook: Turk, Jr., Introduction to Environmental Studies, W.B. Saunders, 1980.

References:

Andrews, W.A.(ed), Environmental Pollution, Prentice-Hall, 1972.

_____, Freshwater Ecology, Prentice-Hall, 1972

_____, Terrestrial Ecology,Prentice-Hall, 1974.

Gimlin, H.,Energy Issues: New Directions and Goals, Congressional Quarterly, Inc., 1982.

Greenburg, et.al., Standard Methods for the Examination of Water and Wastewater, 1981

Nebel, P.W., Environmental Science, the way the world works, Prentice-Hall, Inc., 1981.

Odum, Fundamentals of Ecology, W.B. Saunders, 1981.

Purdon, P.W. and S.H. Anderson, Environmental Science: Managing the Environment, Merrill Publishing Co., 1980.

Rash, J.K., Protecting our Environment: The Pollution Problem, Globe Book Co., 1975.

Tolman, R.R., (supervisor), Biological Science: An Ecological Approach Houhton Mifflin Co., 1982.

Ward and Wipple, Freshwater Biology, Wiley & Sons., 1959.

Audio-Visual:

Solo-Learn, (Wards Scientific): Introduction to Ecosystems
Population Dynamics
Introduction to Ecological Communities
Ecology of Eutrophication

Prentice-Hall Media:(filmstrip/cassette): Air Pollution
The Sea Otter & Its Environment
The Case of the Bighorn Sheep
The Sea Otter and Man
Water Pollution: Salt Water
Water Pollution: Fresh Water
Beer Can by the Highway
The Deciduous Forest
How Environments Change

Houghton-Mifflin Film Loops:

Life in the Intertidal Region
Mountain trees- an Ecological Study
Praries and Deciduous Forests
Water and Desert Animals
Water and Desert Plants

Public Service Electric & Gas Co. (Filmstrips & cassette):

America's Changing Energy Story (filmstrip)
More to Come (Filmstrip/cassette)
Natural Gas Energy Kit (reference)
Natural Gas- Science Behind

Equipment and Supplies*:

Lamotte Water Test Kit - Tests for Cu, NH_3-N_2, CN,NO_3,TDS,Fe,Cr, sulfide,CO_2, alkalinity, chlorides, salinity, PO_4, Ca-Mg hardness, chlorine, pH.

Soil Test Kit- tests for acidity

Lamotte Individual Test Kits- chloride, iron, turbidity, color, nitrate, detergents, hardness.

1 set screen soil sieves

1 Hach Nitrate-Nitrite Test Kit

2 sampling nets (fine and coarse)

1 Water sampling instrument

2 Plankton drag nets

plankton sample bottles

1 bottom sampler

1 Meter sampling grid

1 rectangular screen soil sieve

2 seine nets (20ft X 1/8 in. mesh; 4 ft X 1/8 in. mesh)

1 soil sampler

3 Berlese funnels

2 pHydrion paper dispensers w/ph paper (ph 6 - 8)

2 small animal traps

6 plastic sample bottles (water)

1 Biomonitor (for indicator organisms)

1 Hach Hydrogen Sulfide Test Kit

* already in stock

ENVIRON SCI ORDERS 1983/84

COMPANY	ITEM TYPE	QUANTITY	ITEM DESCRIPTION	CATALOG NUMBER	UNIT PRICE	TOTAL PRICE
CAROLINA	SS	6 EA	AIR POLLUTION SAMPLING PUMP	65-3050	18.75	112.50
		24 EA	SAFETY GOGGLES	64-6702	2.10	50.40
	SSKIT	1 KIT	LIMNOLOGY WATER TEST KIT	65-2400	153.30	153.30
		1 KIT	REFILL UNIT FOR LIMNOLOGY WATER TEST KIT	65-2402	48.00	48.00
		1 KIT	ALKALINITY (1.0-500 PPM) WATER TEST KIT	65-2802	13.10	13.10
		1 KIT	DISSOLVED OIYGEN-REFILL KIT	65-2866	9.85	9.85
		1 KIT	CHLORIDES WATER TEST KIT REFILL KIT	65-2831	8.80	8.80
		1 KIT	WATER TEST KIT-COLOR-REFILL KIT	65-2846	3.95	3.85
		1 KIT	WATER TEST-DETERGENT-REFILL KIT	65-2861	9.90	9.90
		1 KIT	WATER TEST-IRON-REFILL KIT	65-2877	5.40	5.40
					TOTAL:	415.10
CAROLINA BIOLOGICAL SUPPLY CO.	SSKIT	1 KIT	AIR POLLUTION TEST KIT S-LAMOTTE	65-3040	257.50	257.50
					TOTAL:	257.50
FISHER SCIENTIFIC	SSKIT	1 KIT	SOIL ORGANISM STUDY KIT	S19410	38.50	38.50
		2 KITS	COLIFORM BACTERIA TEST KIT	S25022	30.00	60.00
		1 KIT	COMPLETE SOIL TESTING STATION (LAMOTTE)	S17704	134.30	134.30
		1 KIT	AN ATMOSPHERE IN CRISIS MODULE	S19451	37.50	37.50
		1 KIT	THERMAL AND SEWAGE POLLUTION KIT	S25824	52.75	52.75
		1 KIT	AIR POLLUTION KIT	S17667	33.00	33.00

ENVIRON SCI ORDERS 1983/84

COMPANY	ITEM TYPE	QUANTITY	ITEM DESCRIPTION	CATALOG NUMBER	UNIT PRICE	TOTAL PRICE
					TOTAL:	356.05
SARGENT	S	2 EA	TEMPERATURE INVERSION CHAMBER	9645D	33.00	66.00
	S-KIT	1 SET	CARBON MONOXIDE TEST SET (LAMOTTE)	9717-13	39.80	39.80
		1 KIT	GAS AND ODOR CONTROL KIT	9645K	11.95	11.95
		1 KIT	SOLID WASTE AND RECYCLING KIT	9736J	79.50	79.50
		3 KIT	SCREEN SIEVES KIT	6820R	24.75	74.25
					TOTAL:	271.50
WARDS	S	1 EA	STERIFIL FUNNEL AND HAND VACUUM ASSEMBLY	36W5424	63.60	63.60
	S-KIT	1EA	WATER POLLUTION DETECTION OUTFIT REAGENT REFILL	21W0011	81.10	81.10
		1 KIT	MICROORGANISMS IN THE SOIL KIT	36W5420	39.50	39.50
	S-THERM	6 EA	SOIL TEMPERATURE THERMOMETERS DUAL SCALE	15W0845	8.75	52.50
					TOTAL:	236.70
					TOTAL:	1,536.85